Aug. 8, 1961 N. C. L. BROWN 2,995,324

RAILWAY SWITCH POINT BEARINGS

Filed Nov. 12, 1957 3 Sheets-Sheet 1

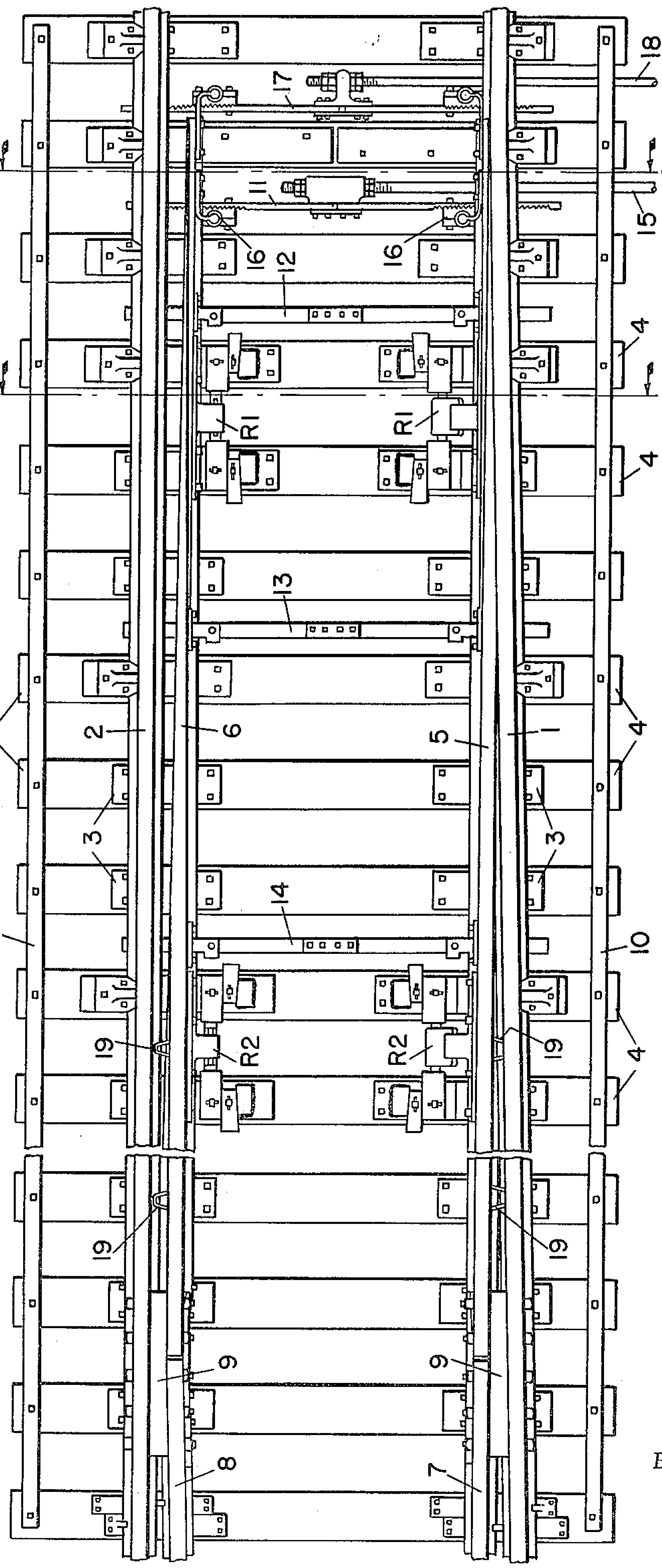

FIG.1.

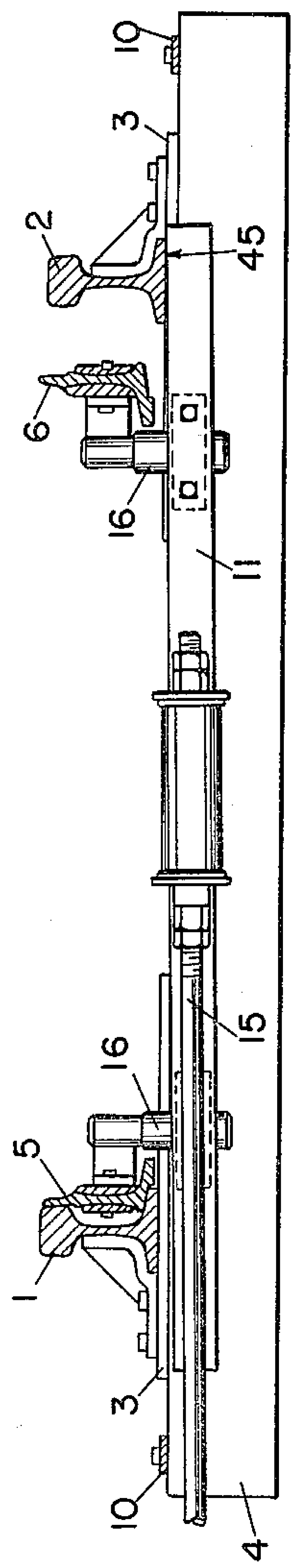

FIG.2.

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FIG. 3.

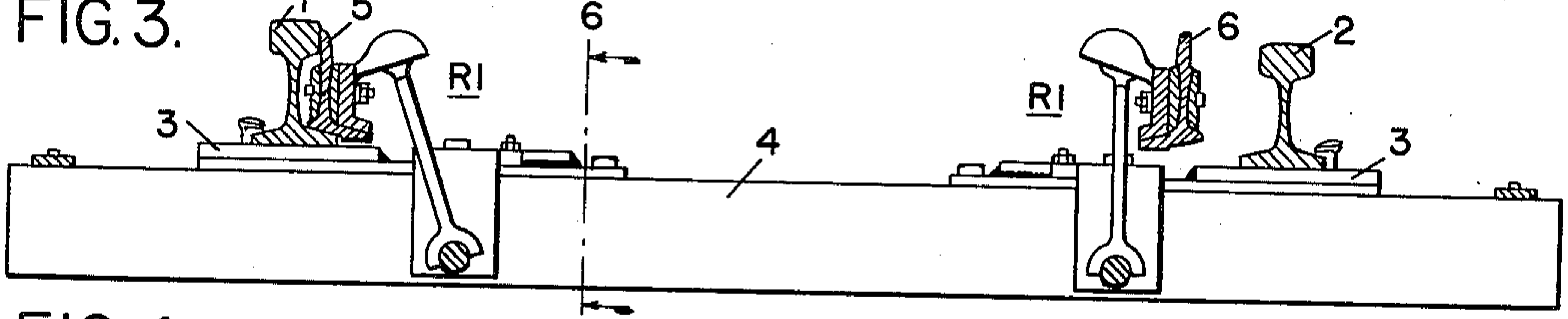

FIG. 4.

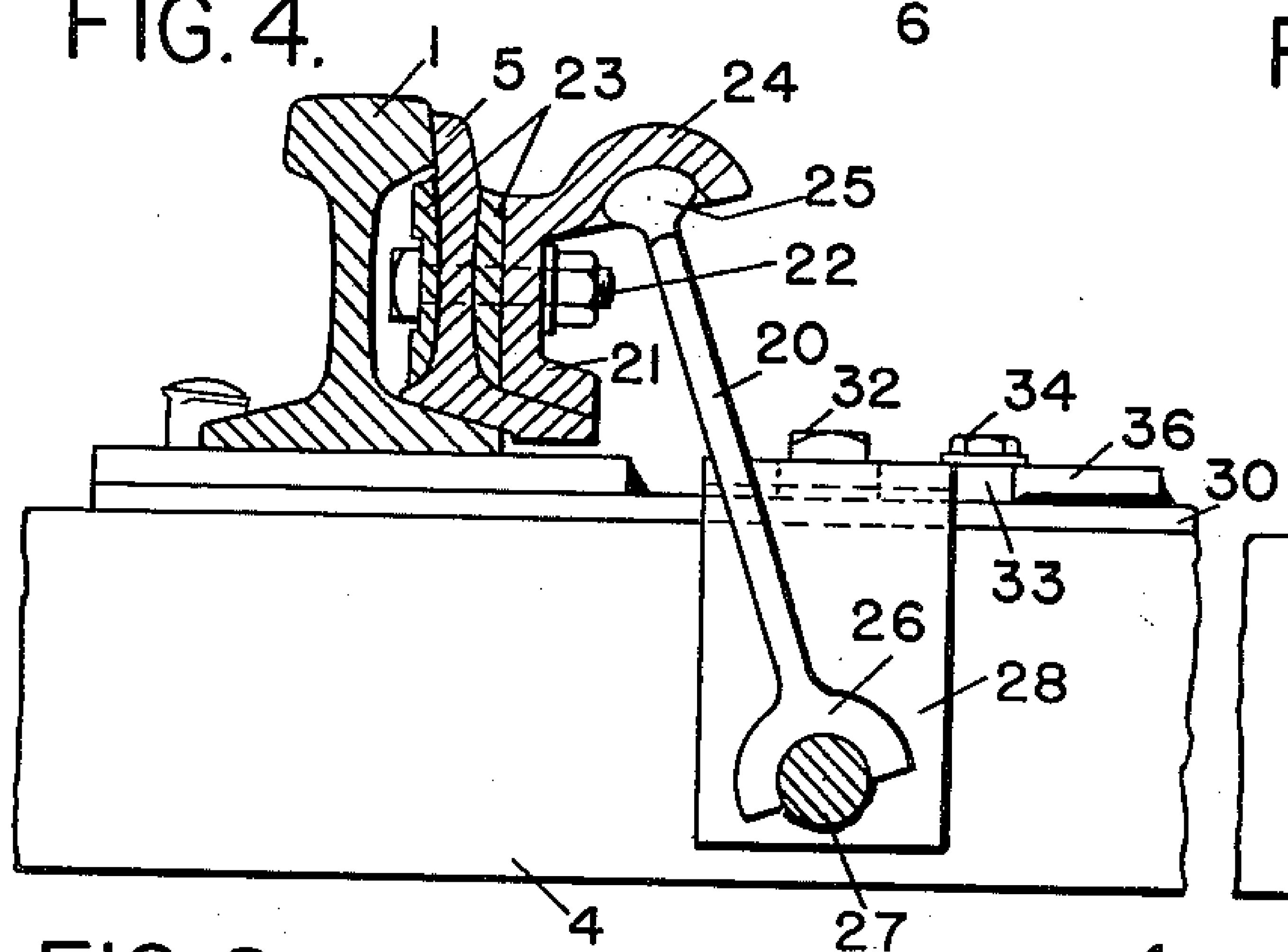

FIG. 5.

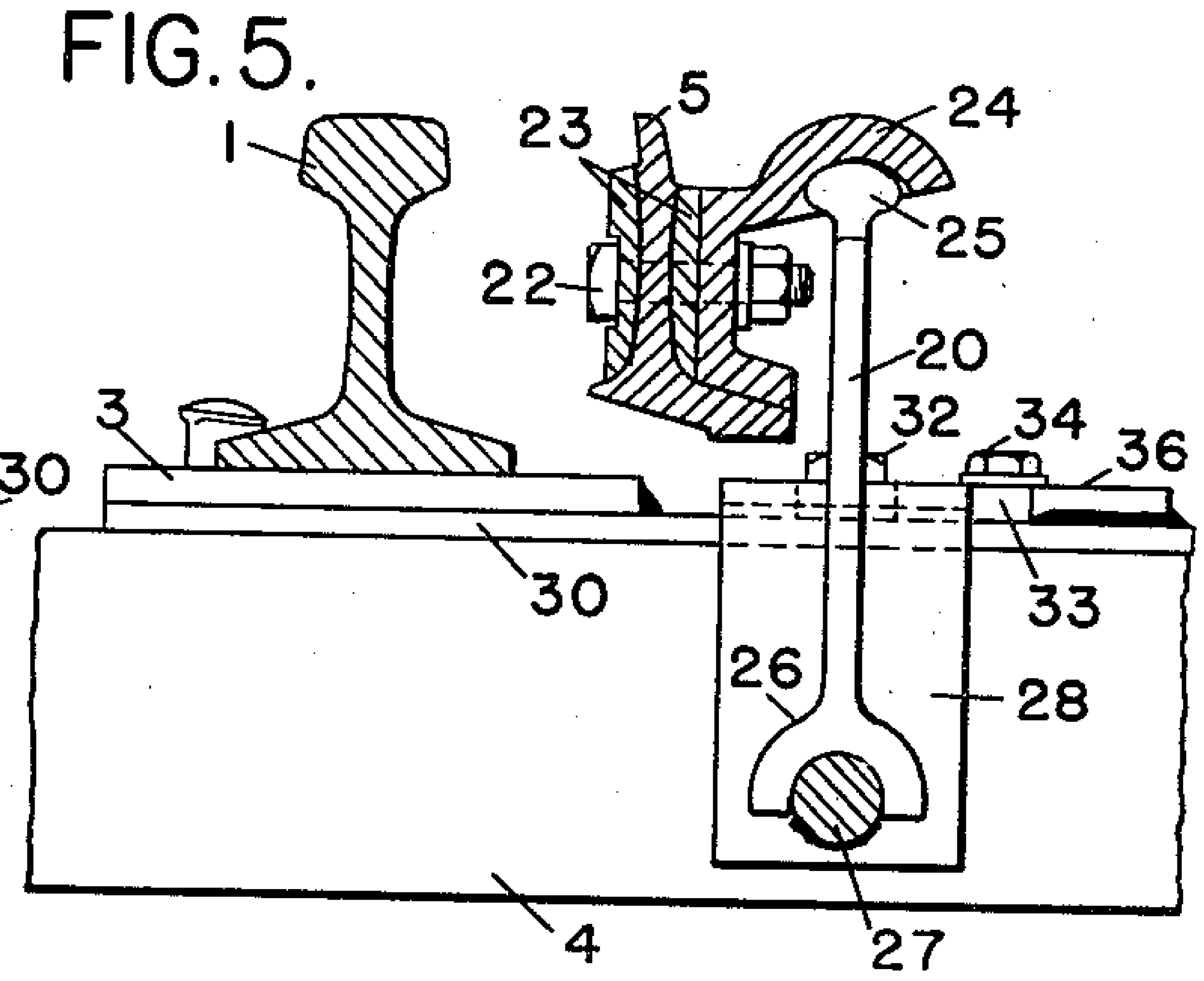

FIG. 6.

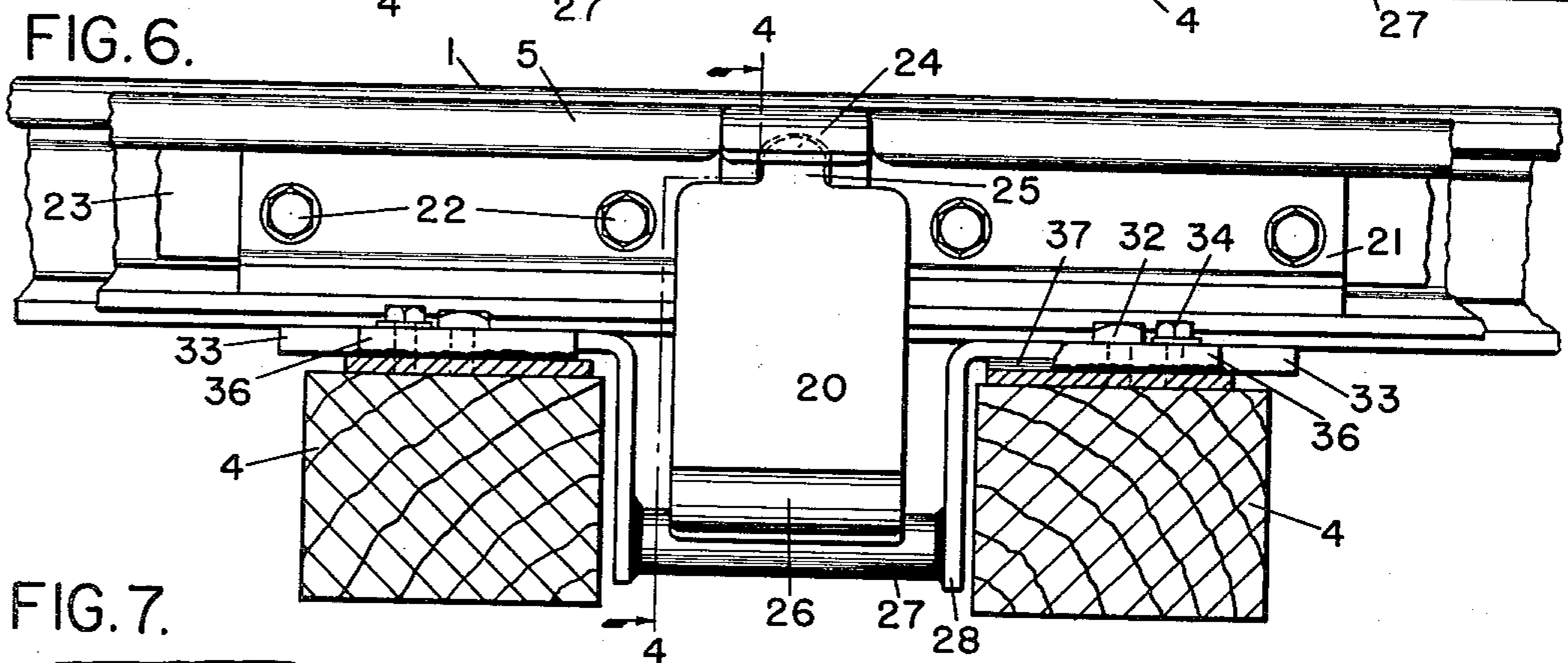

FIG. 7.

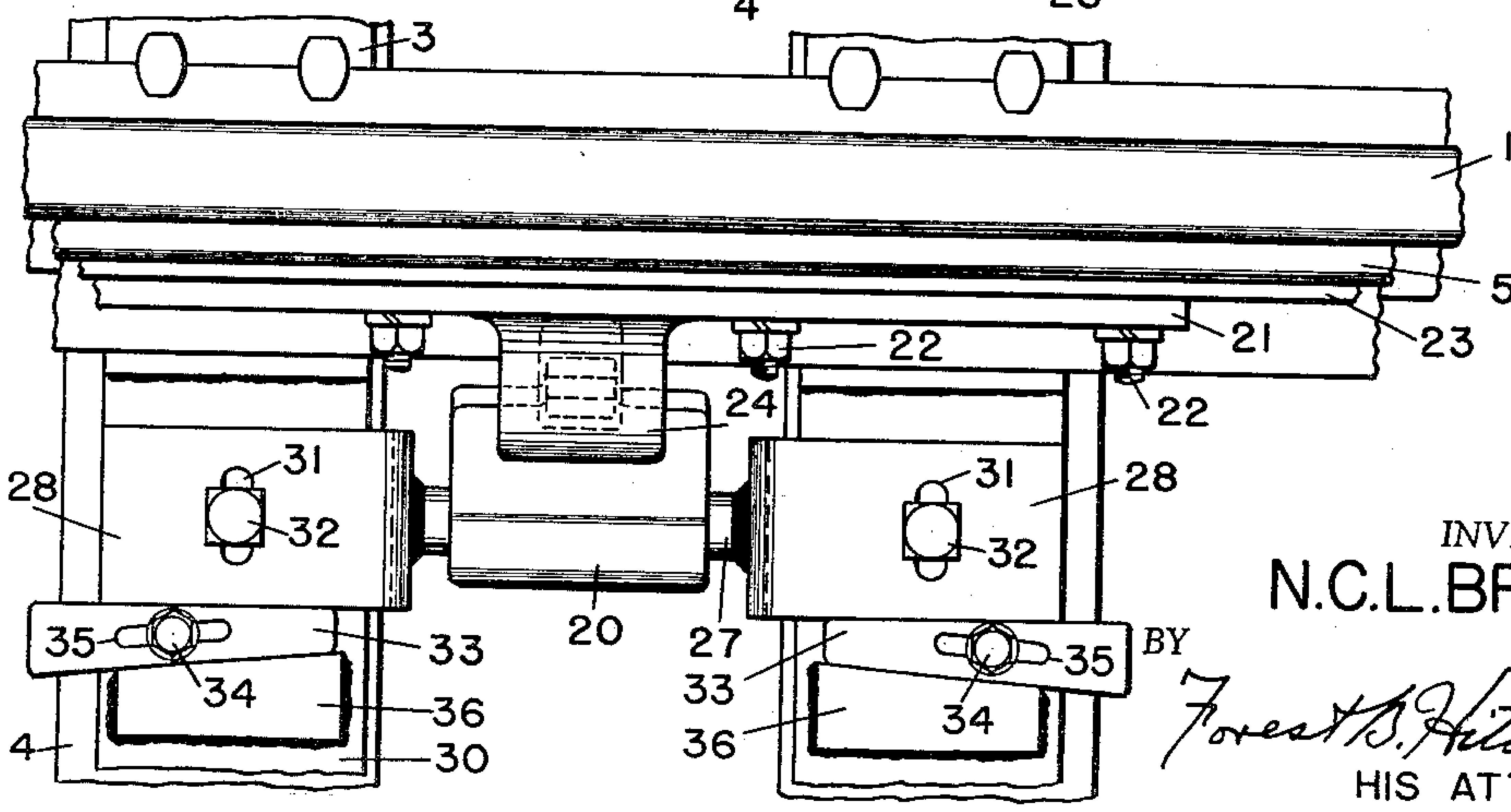

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FIG. 8.

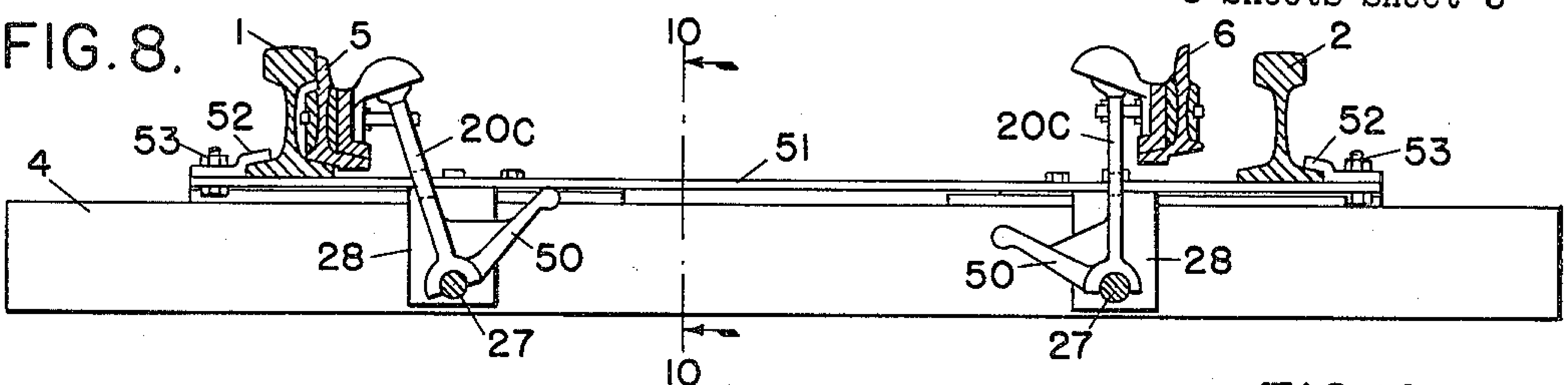


FIG. 9.

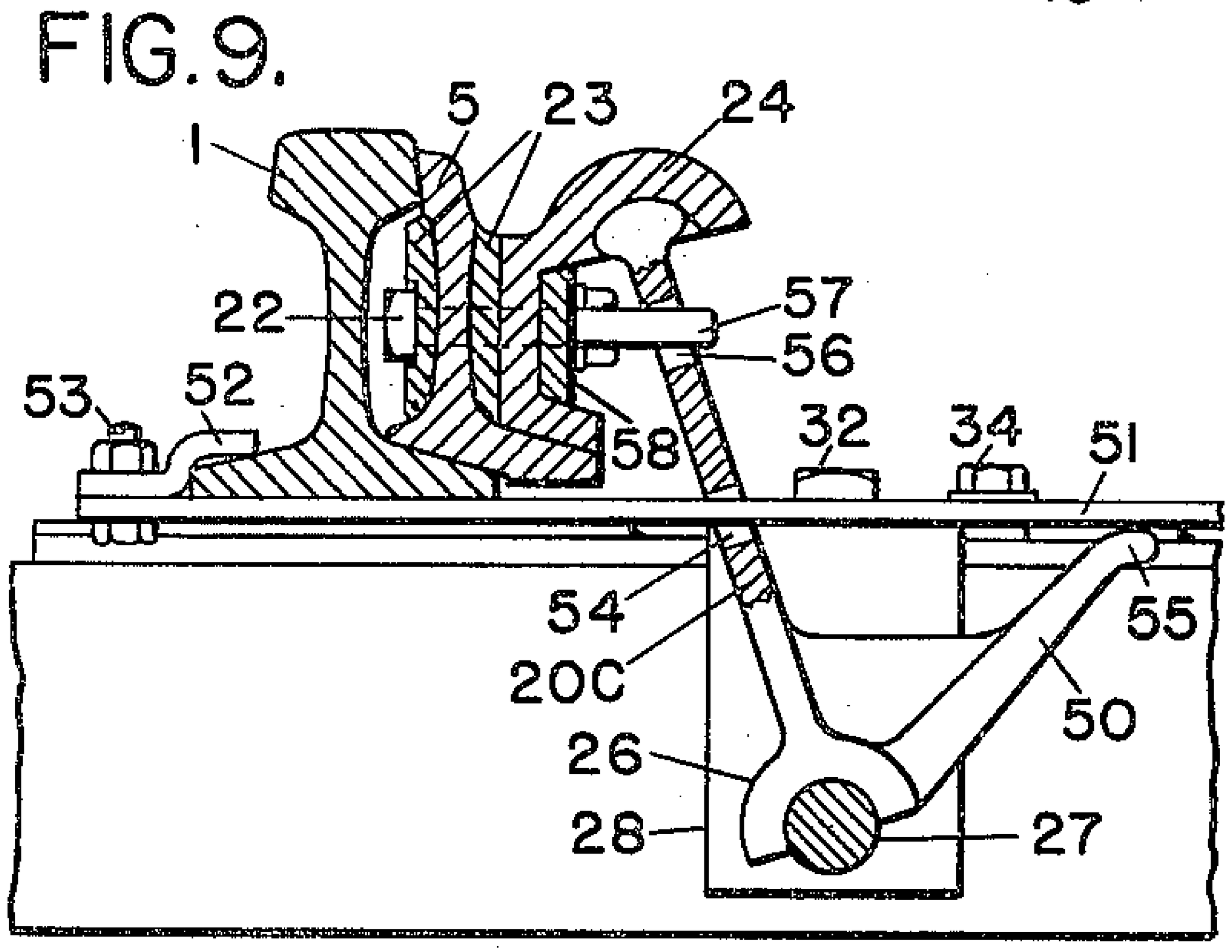


FIG. 10.

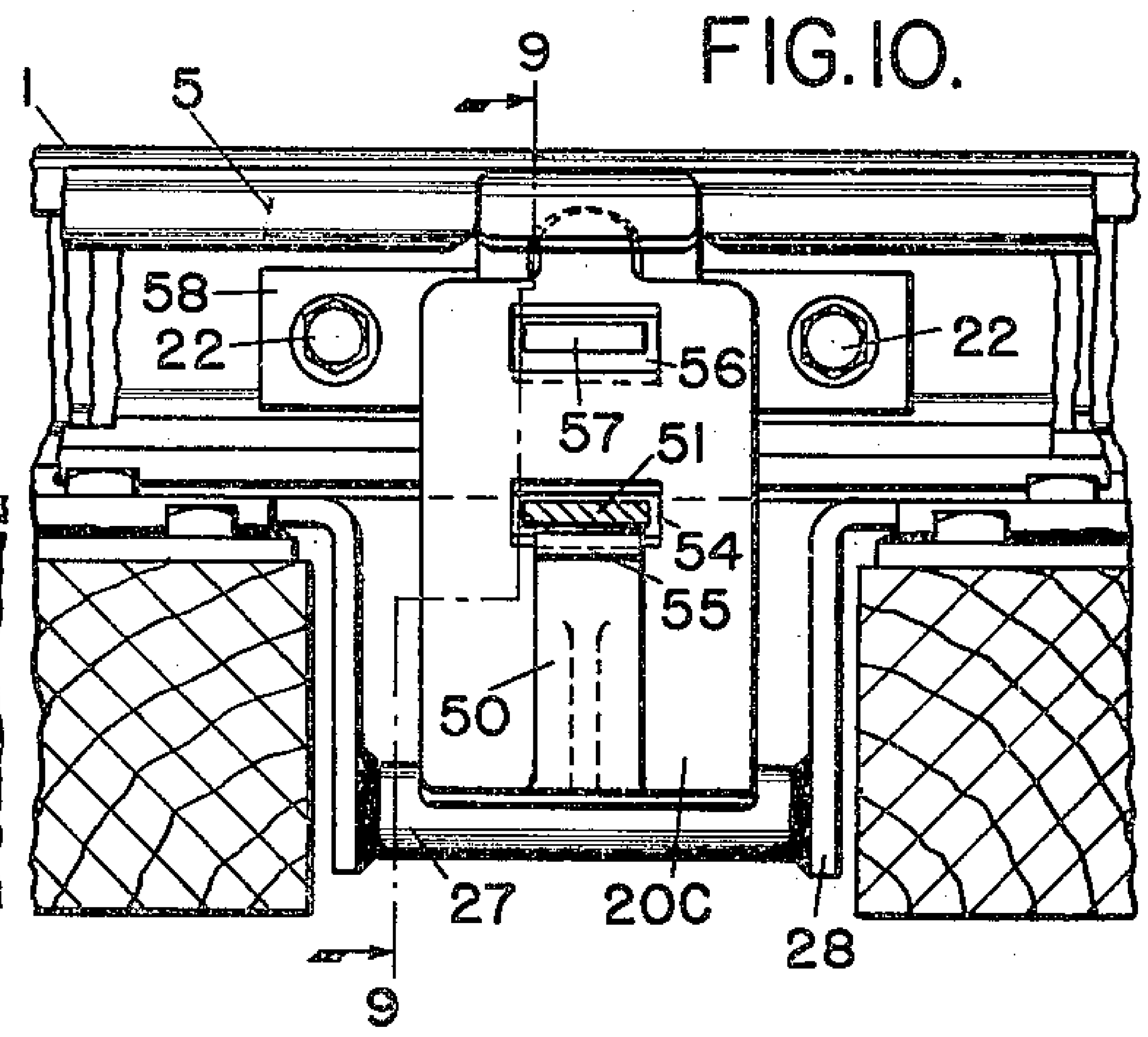


FIG. 13.

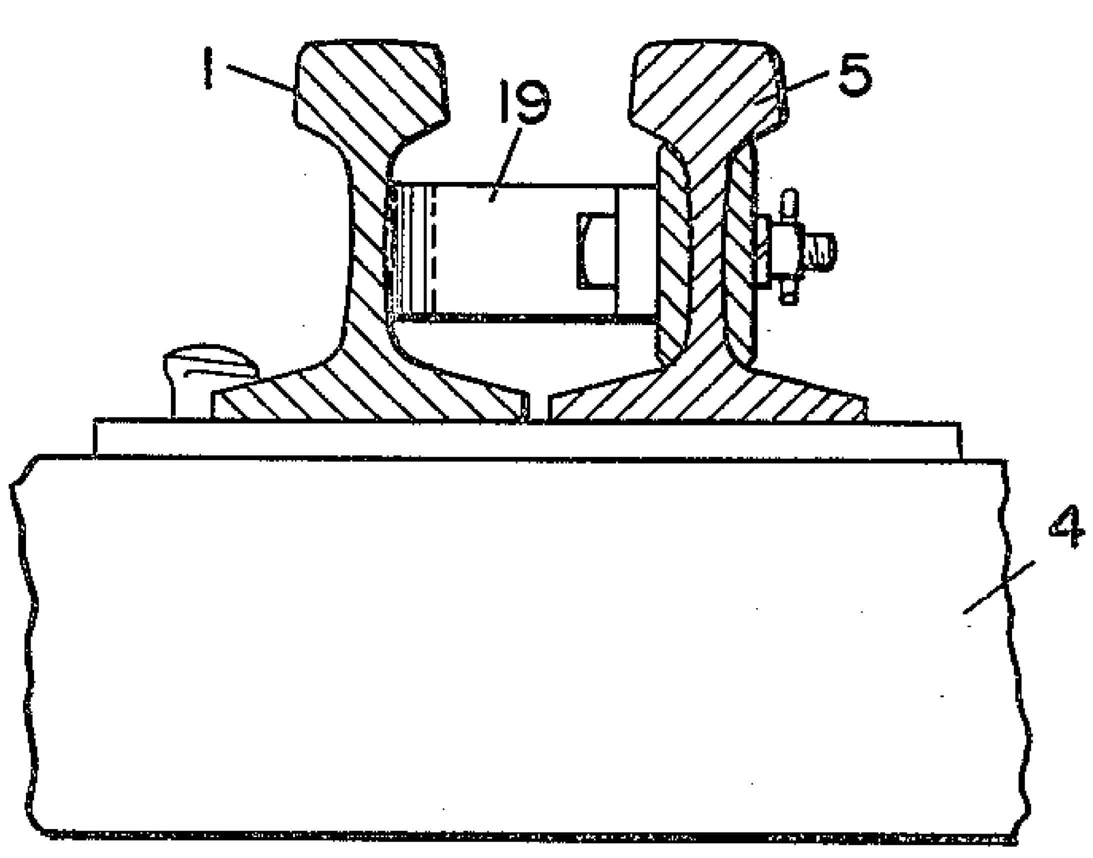


FIG. 12.

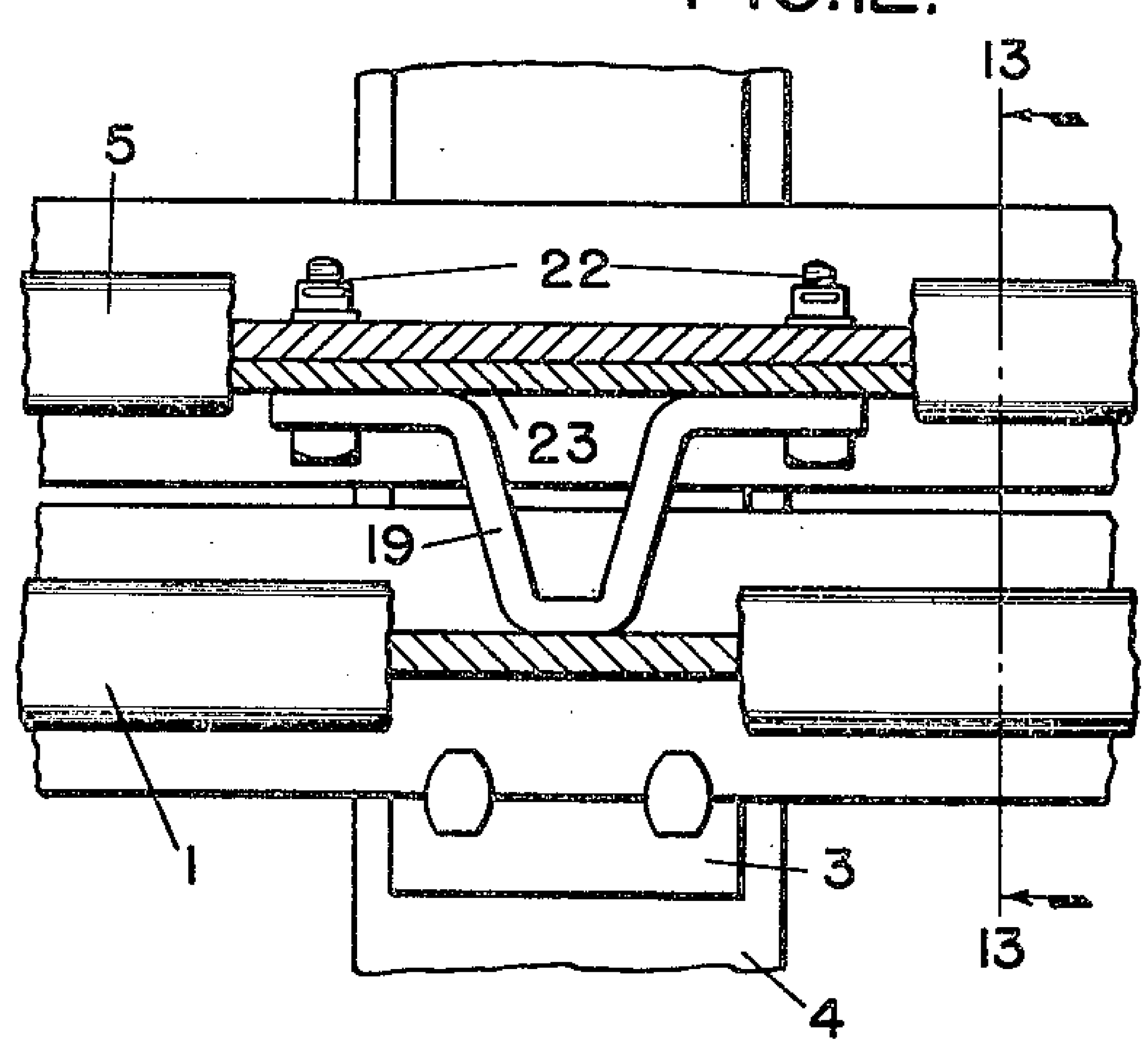
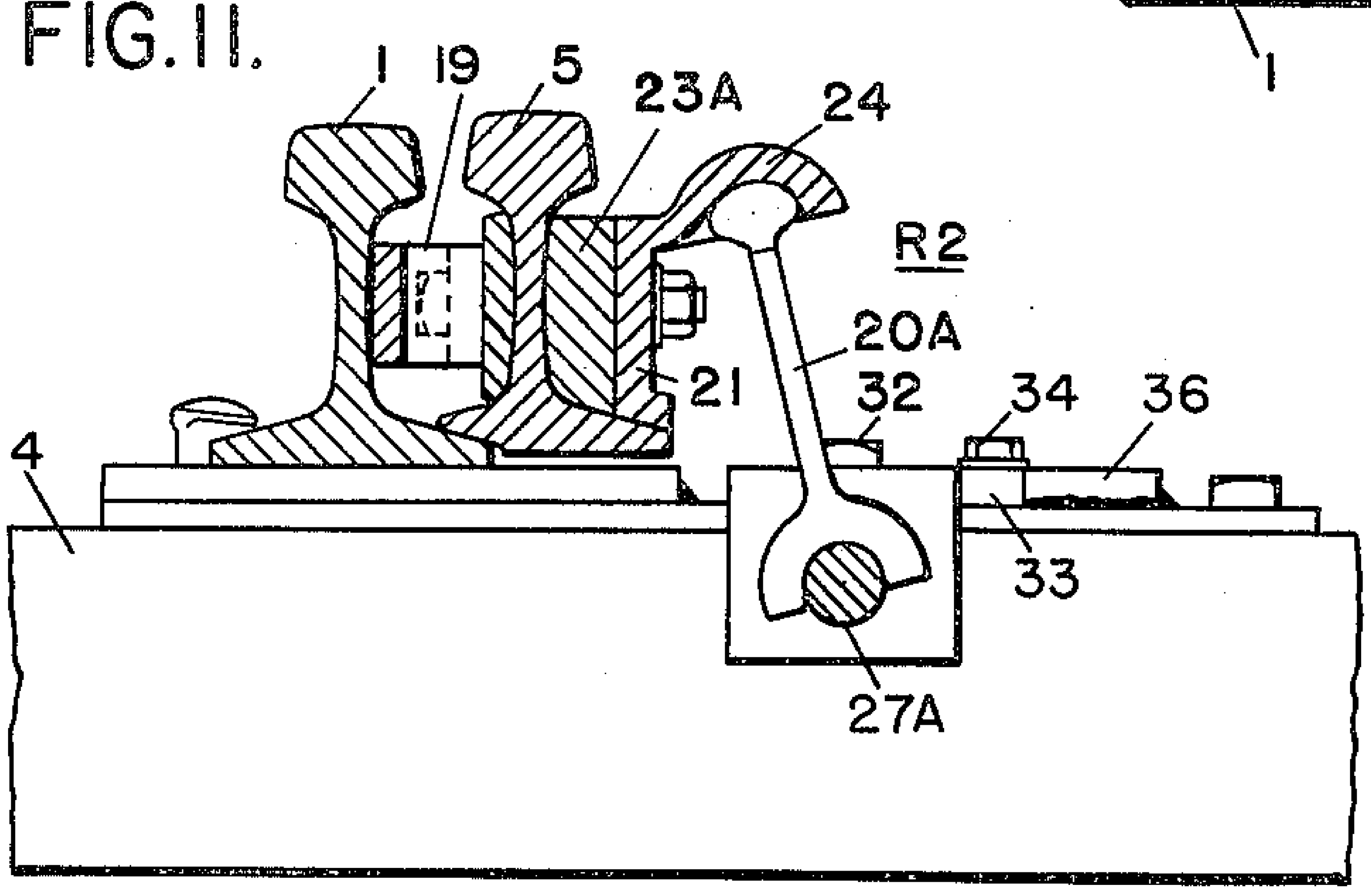


FIG. 11.



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RAILWAY SWITCH POINT BEARINGS

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6 Claims. (Cl. 246—453)

This invention relates to railway switch point operation, and more particularly relates to a structure for reducing friction during the movement of the switch points from one switch position to another.

Modern day railroading which requires higher speed movement of trains on single track lines having various passing sidings calls for switching movements which must be made quickly and positively as many of these passing train movements are made with both trains in motion. Also, as a general rule, such switches are made longer to cut down as much as possible the sharp curves encountered in a short switch. Furthermore, due to heavier rolling stock, the tendency has been to use heavier rails. Such type of switches naturally results in more bulk and weight to be moved by the switch operating mechanism.

In standard railway switch construction, the switch points each comprise a modified single rail which is suitably fastened at its heel end to a stock rail by means of a heel block which acts as a pivotal point to permit movement of the leading end of the switch point to an open or closed position. The amount of movement is determined by the throw of the switch operating mechanism and is usually approximately five inches at the leading end to allow wheel flange clearance at the open switch point. These switch points are spaced apart and tied together by means of a series of spaced switch rods extending between the switch point rails so that they move in unison. When one switch point is closed and bearing against its associated main or stock rail the other switch point is open and spaced its maximum distance from the other main or stock rail.

The main rails are secured to and rest upon tie plates secured to the ties which are part of the railway roadbed; whereas, the switch point rails for the most part merely rest on the tie plates and are slidably movable thereon. The leading ends of the switch point rails have their base portion partially cut away on a taper so that in a closed position they rest on the base portion of their associated main rail rather than on the tie plates. This construction provides a tendency for the switch point rail in its closing motion to lift free from the tie plates and permit a close snug contact with its associated main rail. The switch rods, which tie the switch points together, are constructed long enough to extend under the main rails at both ends with a suitable clearance therebetween so that any undue tendency of the switch points to lift is arrested at the limit of the clearance provided.

It can thus be understood that the entire weight of the switch point rails and their associated fittings bears on the tie plates and partially on the base of a main rail at all times and considerable sliding friction is present during the movement of the track switch from one position to the other. Greasing or oiling the bearing surfaces may alleviate this condition to some extent, but the accumulation of dirt, sand and other foreign substances which mixes with the lubricating agent can actually increase the amount of friction. Also, as all parts of the track switch are at rest when the switch movement is started, there is considerable static friction present which must be overcome by the starting effort.

Another factor which tends to produce additional sliding friction and work against the operating force is the fact that the distribution of the weight of the switch points to the various tie plates may become very uneven due to poor tamping of the ballast supporting the ties. This may bring about a situation wherein a particular tie plate is supporting more than its shart of the weight. If such a situation existed particularly near the longitudinal center of the switch point rail, the friction might be so great that an attempt to throw the switch points from one position to another might actually result in a distortion or bending of the rail between the point of extreme friction and the leading end of the rail. Other frictional resistance is also inevitably present at the heel block ends of the switch point rails, because at this point the switch point rails are usually fastened to the stationary rails and there is a possibility that the switch point rails are actually forced down against their supporting tie plates.

With the above frictional problems in mind, the present invention proposes a means whereby a rocking lever bar supporting type of arrangement is employed to lift the closed switch point upon its initial starting movement, thus breaking the static friction between bearing surfaces. Furthermore, the switch point is then supported on the rocking lever bar arrangement and carried thereby during the rest of its movement to its other position. This substantially eliminates all sliding friction between the base of the switch point rail and the tie plates, where relative motion exists.

Also, the structure is such that, although a slight extra effort may be needed to lift and rock the closed switch point on one side of the switch to an open position, this extra effort is counteracted to the extent that the open switch point on the other side of the switch, which is normally in a lifted position, will lend its weight as it moves into a closed position.

Generally speaking, the rocking lever bar supporting arrangement of the present invention is applied to each switch point rail at a location a few feet back from its leading end, preferably near the number two switch rod. In some instances where extra long high speed switches are used, the switch point rails may be up to thirty feet long and it is contemplated using another rocking lever bar supporting arrangement at a location about midway along the length of the switch point rail. These rocking lever bars or support members are individually mounted and have connection with each other only through the switch points and connecting switch rods. Thus, they may be adjusted individually to their required operable positions.

Each rocking lever support device comprises in general a lever bar mounted between a lower bearing bridge member which is adjustably mounted on tie plates and an upper bearing bracket which is mounted on the switch point rail. The bearing surfaces of the upper bracket and the lower end of the lever bar are of substantial inverted cup shape, thus excluding dirt and other foreign substance from the bearing surfaces.

The lever bar is positioned to lean towards the switch point rail when such switch point is in its closed position and will assume an approximate upright position when such switch point is in its open position. The arc of travel of the upper lever bar bearing is determined by the throw of the switch points, therefore the lower lever bar bridge member bearing is adjustable horizontally to provide the proper arc of travel. Flat shims may be placed between the lower bearing bridge member and the tie plates if any vertical adjustment is necessary.

This type of rocking lever bar supporting arrangement provides an added feature in that when the switch point rail is being returned to its closed position, the arc of travel is downward as well as toward its associated main rail so that the added weight of the switch point rail helps to force itself tightly into position against the main rail. Also, when the closed switch point rail is in position, the opposite switch point rail will be in its open raised position, thus tilting the complete switch towards the closed switch point side which aids in holding the closed switch point in position. Furthermore, as this closing force is transmitted to the top portion of the closed switch point through the tilted lever bar, the lever bar tends to prevent outward tilting or so called rolling of the switch point rail which is quite common and objectional in conventional switch layouts.

Spacing blocks or clips are usually provided for mounting between the switch point rail and its associated stock rail at spaced interval locations extending along the heel-end half of the switch point rails. The normal function of these spacing blocks is to prevent spreading of the switch point rails, but in this instance they also prevent any inward tilting of the switch point rail towards its associated stock rail, which tendency may be present because the tilted lever bar is pushing against the head of the switch point rail.

Another feature of this rocking lever bar type of switch point suspension disclosed in the present invention as compared to other known spring type suspension is the fact that the closed switch point, if properly adjusted, is always down in position on the roadbed when a train is moving thereover, rather than having to be held down intermittingly by the passing car wheels of the train. Furthermore, in case of improper adjustment of the lower bearing bridge member or if for some other reason the leading end of the switch point rail should protrude above the main rail, the structure of the rocking lever support device is such that it could support the weight of the train.

Another feature of the present invention and the rocking lever bar supporting arrangement proposed herein is the ease with which trailing switch movements may be made through track switches equipped with spring switch mechanisms. These spring switch mechanisms are generally provided at locations where it is desired to permit train movements without manual or power operation of the switch points. Such spring switches permit train movements in either direction for their normal positions and permit train movements for their reverse positions only in one direction, i.e., from the trailing point side. The spring switch mechanisms are provided with a spring buffer arrangement such as disclosed in the U.S. patent to O. S. Field, Patent No. 2,361,468, dated October 31, 1944, and to which reference may be made for a more detailed explanation of the operation and structure of a spring switch. Generally speaking, the spring switch is moved from its normal position to its reverse position by the wheels of a train, and a spring buffer arrangement is provided so that the points do not slap back and forth as the successive wheels of the train pass through in a trailing point direction. Since the operation of the points is effected by the train wheels themselves, it is readily apparent that the operation should be made with a minimum amount of friction and that the restoration of the points be complete. The present invention is particularly adapted to reduce the friction between the switch point rails and their tie-plate supports so as to cause such spring switches to be efficient in their operation.

More specifically, and with reference to the present invention, when a train is making a movement through a closed spring switch in a reverse direction, the wheel flanges on the train car wheels must move the switch points and the elimination of friction is highly desirable as it lessens the force required to move the load. As the train moves into the switch section, the wheel flanges bear against the open switch point rail and force it toward a closed position. This movement pulls the closed switch point away from its associated main rail, the complete switch movement being in the same direction in opposition to the spring switch buffer. As the rocking lever device is normally holding the open switch point in a suspended position, its closing movement would be in an arcuate downward direction and here again, the weight of the switch point rail with its added train weight would aid the movement towards a closed position. When the train has completely passed through the track switch, the spring switch buffer will automatically return the switch point rails to their original positions, which movement will be aided by the presence of the rocking lever bar support arrangement of the present invention.

Another feature of the present invention is the provision of a hold down means in conjunction with the rocking lever support device which positively holds the closed switch point down in position on its supporting tie plates and against its associated main rail. As previously mentioned, in conventional switch construction, the ends of the switch rods extend under the main rails and act as a hold down for the switch points. However, tolerances must be provided to eliminate friction between these switch rods and the bottom of the main rails so that there is free movement between these elements and the switch points could still lift to a certain extent. The hold down feature in conjunction with the rocking lever support device provided herein is particularly advantageous since the switch rod acts as a hold down for the open elevated switch point rail whereas the hold down means on the lever bar is activated to hold down the closed switch point rail, thus maintaining the switch down against its bearing surfaces during the passage of a train.

Other objects, purposes and characteristic features of the present invention will be in part apparent from the accompanying drawings and in part pointed out as the detail description of the invention progresses.

In describing the invention in detail, reference will be made to the accompanying drawings which show various views, some with parts in the background eliminated for clearness, and in which the different parts are referred to by distinctive reference characters and like parts by like reference characters, and in which:

FIG. 1 is a top plan view of a conventional switch layout and shows the rocking lever support devices of the present invention applied thereto;

FIG. 2 is an end sectional view taken substantially on the line 2—2 of FIG. 1 and shows a typical switch rod mounted to the switch point rails with the switch operating rod attached thereto, all reference to the rocking lever support devices of the present invention being omitted for clearness;

FIG. 3 is an end sectional view taken substantially on the line 3—3 of FIG. 1 and shows the rocking lever support devices of the present invention as applied to the switch point rails, all reference to the switch rods being omitted for clearness;

FIG. 4 is an enlarged sectional view of the closed switch point and the rocking lever support device of the present invention substantially as shown in FIG. 3 and taken on the line 4—4 of FIG. 6;

FIG. 5 is a view similar to FIG. 4 except that it shows the parts in an operated position wherein the switch is open;

FIG. 6 is an enlarged side elevation view of the apparatus shown in FIGS. 3 and 4 and is shown partly in section as indicated by the line 6—6 of FIG. 3;

FIG. 7 is an enlarged top plan view of the apparatus shown in FIGS. 4 and 6 and substantially the same as already shown in smaller scale in FIG. 1;

FIG. 8 is an end sectional view similar to FIG. 3 except that it shows the rocking lever support device as modified to show the hold-down feature for the switch points applied thereto;

FIG. 9 is an enlarged sectional view of the closed switch point apparatus substantially as shown in FIG. 8 and taken on the line 9—9 of FIG. 10;

FIG. 10 is an enlarged side elevational view of the apparatus shown in FIGS. 8 and 9 and is shown partly in section as indicated by the line 10—10 in FIG. 9;

FIG. 11 is an enlarged sectional view similar to FIG. 4 except that it shows a rocking lever support device as modified for use at an intermediate point along the switch point rail;

FIG. 12 is an enlarged plan view partly in section of a switch point rail and its associated stock rail showing a spacing block mounted therebetween; and

FIG. 13 is an enlarged sectional view taken on the line 13—13 of FIG. 12 showing the spacing block in position.

Referring now to the drawings, and more particularly to FIGS. 1 and 2, in order to illustrate the present invention applied thereto, there has been shown (partially omitted by broken lines) a typical long switch layout as would normally be used for high speed trains, such as one approximately thirty feet long. The switch layout in general comprises the two main stock rails 1 and 2 which rest upon tie plates 3 and ties 4 forming the track roadbed. The rails 1 and 2 are secured to the roadbed by means of the usual spikes and rail braces. Located between the two main stock rails 1 and 2 are the two movable switch point rails 5 and 6 which are hingedly connected to the two stationary switch rails 7 and 8 by means of heel blocks 9. This type of connection is standard practice and no attempt will be made herein to show or describe the details, except to state that the switch point rails 5 and 6 are free to move back and forth on their supporting tie plates to the extent of the switch point adjustment applied to their leading ends. The amount of this movement must be sufficient to permit clearance for the wheel flanges and correspond to the throw of the switch throwing device (not shown). Suitable tie bars 10 extending the length of the switch are fastened to the ends of the ties 4 to maintain proper spacing between them.

The switch point rails 5 and 6 are spaced apart and tied together by means of a series of switch rods commonly known as the No. 1, 2, 3 and 4 rods and have been designated on the drawings as 11, 12, 13 and 14. The purpose of these switch rods which are spaced throughout the front half length of the switch point rails 5 and 6 is to maintain the switch points in a properly spaced relationship to each other and hold them rigidly upright. These switch rods 11, 12, 13 and 14 also extend underneath the main stock rails 1 and 2 with a slight clearance therebetween and act to prevent any undue lifting of the switch point rails 5 and 6.

The No. 1 rod or switch rod 11 is of special construction and is also used for receiving the switch operating rod 15 which serves as the connection between the switch points and the switch operating mechanism (not shown). This switch rod 11 is mounted near the leading ends of the switch points in a vertical position for strength and rigidity purposes and is adjustably attached to the switch point rails 5 and 6 by means of adjustable brackets having extra long vertical bearings 16 as shown in FIG. 2. As is well known in railway switch construction, the leading ends of the switch point rails 5 and 6 are of necessity very thin in width and this special construction is necessary to maintain them in their upright positions so that bending, tilting and so called rolling is prevented. For a detailed showing and description of this special construction reference may be made to the E. C. Larry U. S. Patent No. 2,584,719, dated February 5, 1952.

The track switch is also provided with a front rod 17 at its very tips for added rigidity for the switch point rails 5 and 6. This front rod 17 is constructed similar to the switch rod 11 and may be connected by a rod 18 to a suitable point detector (not shown) for indicating the fact that the switch points are in their extreme operated positions. The switch rods 12, 13 and 14 are usually mounted in a horizontal position as their main function is to space and hold the switch point rails 5 and 6 in a related position. In some instances, the switch rod 12 is connected to a locking device (not shown) which locks the switch in its last operated position.

Suitable spacing blocks or clips 19 are mounted on the web section of the switch point rails 5 and 6 by means of bolts or the like and are located at spaced intervals between the switch point rails and their associated stock rails 1 and 2 throughout the heel end half of the switch assembly. These spacing blocks, shown more in detail in FIGS. 12 and 13, are of selected widths so that they fill the space between the webs of the switch point rail and the stock rail with the switch point in a closed position, this space getting greater as the heel end of the switch is approached. It can be seen that the individual closed switch point rail no longer contacts its associated stock rail throughout the heel end half of the switch. The spacing blocks 19 are provided so that the switch point rail may still bear against its associated stock rail and thus prevent spreading and possible deformation of the switch point rail caused by the train passing therethrough. Also, with the rocking lever bar supporting arrangement of the present invention applied to the switch point rail, the spacing blocks prevent any tipping or distortion of the switch point rail when the rocking lever arrangement is forcing the switch point rail to a closed position, as will be pointed out hereinafter.

Referring now to the rocking lever bar supporting arrangement of the present invention as proposed for alleviating friction during a switch movement, for a long switch such as shown on FIG. 1 of the drawing, it is contemplated that such a device be mounted under each switch point rail 5 and 6 near the leading end of the switch and also near the midway lengthwise section of the switch. With reference to FIG. 1, two such devices designated R1 are shown mounted between a pair of ties 4 at a location to the rear of the switch rod 12 and two other such devices designated R2 are shown similarly mounted at a location to the rear of the switch rod 14.

To facilitate the explanation of the invention, reference will first be made to the structure and position of the rocking lever support devices designated R1. With the switch in a closed position as shown and the route lined up for main line traffic, the switch point rail 5 would be in a closed position against the main rail 1 and resting on the main rail 1 and the tie plates 3 with its rocking lever support device R1 in a tilted non-supporting position as shown in FIG. 3. The switch point rail 6 would be in an open position away from the main rail 2 and would be supported on its rocking lever support device R1 which has assumed a vertical position.

As shown more in detail in the enlarged views FIGS. 4 to 7 inclusive, the rocking lever support device R1 comprises a lever bar supporting member 20 which is suitably mounted between upper and lower bearing surfaces. The upper bearing surface is formed on a bracket plate 21 which is secured to the web of the switch point rail 5 by means of the bolts 22. Suitable shim plates 23 are inserted on both sides of the rail web to facilitate proper alignment. This upper bearing structure consists of a cup shaped lug or socket bracket 24 formed integral with the bracket plate 21 and extending at a right angle thereto. The underside of the socket lug 24 is provided with a mushroom like socket to receive the round mushroom shaped head 25 formed on the top surface of the lever bar 20, thus providing a bearing which permits a rocking motion as well as a rotary motion between the lever bar 20 and the switch point rail 5.

The lower bearing structure is supported on the track roadbed and is formed by providing the lower end of the lever bar 20 with an integral semi-circular shaped bearing cap 26 which bears on a circular bearing support member 27 forming part of a bridge structure. The bearing cap 26 extends the full width of the lever bar 20, thus providing a long bearing surface for contact with the bearing support member 27 which permits a rocking motion and maintains proper horizontal and vertical alignment of the lever bar 20. The bridge structure comprises two angle brackets 28 which are adjustably mounted on and located between a pair of the ties **4** and the bearing support member **27** which extends between the lower ends of the two brackets **28** and is fixed thereto such as by welding or the like.

An adjustment to properly position the lower bearing support member **27** is provided as it is desirable that the lever bar **20** will be positioned in a substantially vertical position upon movement of the switch point rail **5** to an open position, as shown in FIG. 5. In order to obtain this condition, the angle at which the lever bar is originally mounted as shown in FIG. 4 is determined by the amount of throw of the switch point which is equal to the distance between the main rail **1** and the switch point rail **5** as shown in FIG. 5. As this distance is substantially uniform in all installations, the various parts can be manufactured with fairly close tolerances. However, due to slight variations which may result in the location of the ties **4** and the like, minor adjustments may be required. Such adjustment is facilitated by the manner in which the angle bracket portions **28** of the bridge member are secured to the ties **4**.

The angle bracket portions **28** of the bridge member are mounted on auxiliary tie plates **30** which are inserted between the regular tie plates **3** and the ties **4** and suitably secured thereto. The top flat portions of the brackets **28** are provided with elongated holes **31** through which pass the machine screws **32** which are threaded into the plates **30**. The elongated holes **31** permit movement of the bridge member horizontally toward and away from the switch point rail **5** when the machine screws **32** are loose. Wedge shaped plates **33** are mounted on the plates **30** by means of machine screws **34** which are threaded into the plates **30** and pass through elongated holes **35** in the wedge plates **33**. These wedge plates **33** are positioned between the bracket portions **28** and another wedge plate **36**, which is welded to the plate **30**. Thus, with the machine screws **32** and **34** in a loosened condition, the wedge plates **33** may be moved back or forth to position the bridge member with respect to the switch point rail **5**. When the proper position for the lower bearing support member **27** has been determined, the machine screws **32** and **34** may be tightened down to secure the bracket portions **28** and the wedge plates **33**.

In all installations, after the above mentioned assembly and the adjustments have been made, it is desirable that the lever bar **20** should fit snugly between its upper and lower bearing surfaces when in its closed switch point position as shown in FIG. 4. For this reason shim plates **37** have been provided which are inserted between the tie plates **30** and the angle brackets **28**. Removal of or adding to these shim plates **37** will either lower or raise the bridge member and consequently the lower bearing support member **27** so that the distance between the upper and lower lever bar bearing surfaces may be varied to accommodate the lever bar **20**.

With reference now to the rocking lever support devices R2 which are located near the midway lengthwise section of the switch, their structure is very much the same as the rocking lever support devices R1 already described. At this midway point of the switch, the movement of the switch point rails **5** and **6** is only approximately half the distance of travel required at the leading end of the switch. Also, the lift of the switch point rails **5** and **6** produced by the rocking lever bar action need only be approximately half that required at the leading end of the switch. Consequently, the degree of travel is reduced and the radii of the arc of travel is smaller as shown in connection with the switch point rail **5** in FIG. **11**. This is accomplished by reducing the length of the lever bar **20A** and raising the lower bearing support member **27A** to the proper height to accommodate the shorter lever bar. Also, as the head portions of the switch point rails **5** and **6** are of full size at this midway section of the switch, it is necessary to provide a wider shim plate **23A** between the web of the switch point rail and the socket bracket or lug **24** of the bracket plate **21** to provide the necessary wheel flange clearance.

Assuming now that it is desired to operate the switch from its closed position as shown to an open position, the switch operating mechanism (not shown) will operate the rod **15** to the right; thus moving the switch rod **11** and the switch point rails **5** and **6** to the right. As movement of the switch point rails **5** and **6** begins, each lever bar **20** will pivot on its lower bearing support member **27** at its lower end **26** and its upper bearing head **25** and associated switch point rail will swing through a prescribed arc until the switch movement has been completed. This arcuate movement of the lever bars **20** will cause the switch point rail **5** to be lifted from its normal bearing surface on and against the main rail **1** as shown in FIG. 4, whereupon it will be supported by its associated lever bar **20** as shown in FIG. 5; whereas the switch point rail **6** which is normally supported on its associated lever bar **20** will be permitted to drop and rest on and against the main rail **2**.

With the application of the rocking lever suport devices R1 and R2 to the switch point rails **5** and **6** as just described, it can be seen that the sliding contact between the bases of the rails and the roadbed structure during a switch movement has been eliminated, with the possible exception of a short section near the heel blocks. The open switch point rail is normally supported above the roadbed by its associated rocking lever support devices and does not come into contact with the roadbed bearing surfaces until it again reaches its closed position against the main rail. The closed switch point rail which is normally bearing partially on the base of its associated main rail and partially on the roadbed tie plates is immediately lifted free therefrom due to the rocking action of the lever bar **20**. This lifting action of the rocking lever bar thus breaks the static friction at the start of the switch movement and supports the switch point rail during its movement so that no sliding friction between the switch point rail and the roadbed supports is present.

The action of the rocking lever support devices R1 and R2 has a further advantage in that it facilitates a better cooperation between the closed switch point rail and its associated main rail. It can be seen that in a closing movement of a switch point rail it is swung in a downward arc towards its associated main rail so that the weight of the switch point rail itself together with the angular force of the lever bar will cause a combined force having a tendency to jam and hold the switch point rail tightly in position against its associated main rail. This downward closing force exerted by the closing switch point rail also assists in the movement of the switch points and helps to overcome any extra force required to lift the closed switch point rail.

As previously mentioned, with the closed switch point rail **5** in position against its associated stock rail **1** as shown in FIG. 4, the lever bar **20** will be in its tilted position towards the switch point rail **5** and transmitting its closing force against the top portion of the switch point rail. Thus, the lever bar **20** tends to prevent outward tilting or so called rolling of the switch point rail at and near its leading end. Any inward tilting of the switch point rail **5** at or near its leading end due to the force of the lever bar **20** is prevented as the head of the switch point rail **5** is bearing directly against the head of the stock rail **1**.

However, back at the mid switch location of the rocking lever support device R2, as shown in FIG. 11, it can be seen that the heads of the rails **1** and **5** no longer contact each other when the switch point rail **5** is in its closed position, due to the gradual spread in distance between these rails. Under this condition, the closing force exerted by the lever bar **20A** against the top portion of the switch point rail **5** might have a tendency to tilt or twist the switch point rail in a direction towards the stock rail **1**. This would especially be true if the lever bar **20A** was out of adjustment and not permitting the switch point rail to seat properly. For this reason, one of the spacing blocks 19 mentioned hereinbefore is attached to the switch point rail 5 at a point directly in line with the rocking lever support device R2. Now, with the switch point rail 5 in its closed position, the spacing block 19 will bear against the stock rail 1, thus preventing any inward tilting of the switch point rail 5.

Referring now to the bearing surfaces and the structure of the bearings for the lever bars 20, the lower bearing comprising the bearing cap 26 and the bearing support member 27 are purposely made long to assure an adequate bearing surface to maintain the lever arm on a flat plane and prevent any tilting or binding laterally. Space is also provided so that the lever bar 20 may position itself laterally on the bearing support member 27 to compensate for any so called running of the rail due to expansion or contraction. The upper bearing comprising the mushroom head 25 and the cup shaped socket bracket or lug 24 is preferably made circular to permit both rocking and rotary movement. As each switch point rail is individually fastened to a heelblock, a switch movement causes the switch point rail to rotate slightly, the heel block acting as its pivot point. Consequently, although the switch point rail rocks back and forth on the upper lever bearing, rotary motion must also be permitted between the socket bracket 24 and the head 25 of the lever bar 20.

It should also be noted that these lever bar bearing surfaces are protected due to the fact that the cup shaped socket bracket 24 and the bearing cap 26 are both inverted, thus preventing the entrance of dirt or other foreign substances. Although the structure of these bearings lends them to satisfactory use as they are, lubrication may be used if desired. It should be understood, however, that other suitable type bearing structures could be used if desired.

In the structure already described it should be noted that even though one of the movable switch point rails 5 and 6 is lifted and held in an elevated position by the rocking lever support devices when moved from its closed position to an open position, the other switch point rail which is in its closed position will be bearing on the railroad roadbed. As the closed switch point rail is the one which bears the weight of a train passing thereover, the switch is always in a position to receive a train, as would be the case in ordinary switches not having the rocking lever support devices of the present invention applied thereto.

With reference again to the conventional switch structure, and particularly to the positioning of the switch rods 11, 12, 13, 14 and 17, as previously mentioned these switch rods have their ends extending under the main rails 1 and 2 with a slight clearance between the bottom of the rails and the switch rods. This procedure is considered advisable as it is the only means, other than the weight of the switch point rails themselves, to prevent any undue lifting of the leading ends of switch point rails from the roadbed. The clearance between the rails and the switch rods is necessary to prevent any rubbing friction therebetween which would be present without the clearance, especially in cases where continued use causes uneven tie support for the roadbed or the collection of rust, dirt or snow and ice may cause binding.

In FIG. 2, there has been shown by way of example, the location of the switch rod 11 with respect to the main rails 1 and 2. In a conventional switch the clearance under both rails 1 and 2 would be about the same as that shown under the rail 1. However, this clearance is used to advantage in the present invention because with the rocking lever support devices applied thereto, the open switch point rail 6, which is now in a raised position due to the action of the rocking lever support device, causes that particular end of the switch rod 11 to come into contact with the bottom of the main rail 2 as shown at the point 45. This absolutely prevents any further undue lifting of the switch point rail 6 which might possibly cause the lever bar 20 to become dislodged from its bearing sockets.

With reference to the closed switch point rail 5 which is resting on the roadbed supports in which position the clearance between the bottom of the rail 1 and the switch rod 11 exists, it still is possible for the switch point rail 5 to be accidentally lifted within the limits of this clearance, with the remote chance that the lever bar 20 may be unseated or dislodged from its bearing sockets. In a modified form of the present invention shown in FIGS. 8, 9 and 10, a hold-down means has been provided to prevent the lifting of the closed switch point rail.

Referring again to the drawings, this hold-down means primarily consists of an additional lever arm 50 formed as a part of the rocking lever bar 20C and it is positioned to bear against a flat bar 51 when the switch point rail 5 is in its closed position. More specifically, the bar 51 extends from one main rail 1 to the other main rail 2 on the underside thereof and is anchored to the rails by means of clamps 52 and bolts 53. This bar 51 extends through a slotted clearance hole 54 in the lever bar 20C. The lever arm 50, forming a part of the rocking lever bar 20C, extends at a proper angle thereto and is of such a length that its tip end 55 bears against the bar 51 when the rocking lever bar 20C is moved to a closed switch point position. The rocking lever bar 20C is provided with an additional slotted hole 56 through which extends a lug 57 which forms a part of an anchor plate 58. The anchor plate 58 is fastened to the previously described switch point assembly by means of two of the bolts 22.

In actual operation, with the switch point rail 5 in its closed position as shown in FIGS. 8, 9 and 10, it can be seen that the additional lever arm 50 will bear against the bar 51, thus holding the rocking lever bar 20C down on the bearing support member 27. The rocking lever bar 20C, because of the fact that the surface on the upper side of the slotted hole 56 bears against the lug 57, will in turn hold the switch point assembly down and prevent any lifting thereof. The other switch point rail 6 is in an open position which positions its rocking lever bar 20C in an upright position with the lever arm 50 away from the bar 51, thus no hold-down effect is present. But, as already explained, any further upward movement of this open switch point 6 is prevented because the switch rod 11 is bearing against the underside of the rail 2. Thus, in a sense the complete switch point assembly is locked down during the passage of a train thereover.

From the foregoing description and with reference to the drawings, it should be seen and readily understood that the present invention provides a means whereby a railroad switch movement may be accomplished with a minimum of power loss due to friction and at the same time provide additional features not present in conventional switch movements. The rocking lever support devices of the present invention break the static friction which is present at the beginning of the switch movement by lifting the switch point rails free from the roadbed bearing surfaces and then carries them to their moved positions without any further contact with the roadbed supports, except for the small portion near the heel ends of the switch point rails where they are fastened to their respective heel blocks.

Furthermore, the closed switch point always returns to a position wherein it is resting on the railroad roadbed so that it is capable of carrying the train load in a normal manner and does not have to be forced down upon its bearing surfaces by the weight of the train, as is the case with spring supported switch points. Also, the arcuate downward movement of the switch point to a closing position, when supported and carried by a rocking lever support device of the present invention, assures that the switch point rail will be properly positioned and held against its associated main rail when it comes to rest in its closed position.

The fact that the open switch point rail is always in a suspended position with the lever bar of its associated rocking lever support device in a substantially vertical plane is very desirable since it utilizes the weight of the switch assembly to assist the closing movement as it travels through its arcuate downward cycle. This is particularly advantageous during a trailing switch movement wherein a train passes through the spring switch in a reverse direction as previously explained and the wheel flanges of the cars must force the switch point rails to a reverse position. As part of the train weight would be on the open switch point rail, the downward force would assist the reverse switch movement.

Also, it should be understood that the rocking lever support devices of the present invention could be employed in connection with shorter switch layouts such as are usually found in railway yards, commercial sidings and the like. Due to the rigidity of the shorter switch point rails, one such device located near the leading end of each switch point rail would be sufficient to provide efficient frictionless operation of the switch.

Having shown and described two forms of a rocking lever support device for switch points, it should be understood that various other adaptations and deviations in the structure and operation could be made without departing from the spirit of the invention within the scope of the appended claims.

What I claim is:

1. In a friction reducing structure for a railroad track switch having its two movable points interconnected by switch rods, a bridge member positioned adjacent each point of the track switch and secured to two adjacent railroad ties, a rocker bearing support rod disposed between said ties affixedly attached to each of said bridge members, each said rocker bearing support rod extending substantially parallel to the switch point rails and substantially parallel to each other, a support bracket attached to each switch point and having a downwardly facing socket portion for receiving a ball member, a supporting member for each point, each supporting member having a bearing at its lower end constructed to cooperate operatively with one of said rocker bearing rods, each said lower end being also constructed to have the proper size as to permit its sliding movement longitudinally along its respective rocker bearing rod between said ties, said supporting member having an upper end constructed in the form of a ball to be received by said socket portion of said support bracket, each of said supporting members being positioned to have its upper end engaging its respective socket portion pivotally and to have its lower end engaging its respective bearing support rod rockably, each of said bridge members being located to cause its said respective supporting member for a closed point to assume an oblique angle and for an open point to assume substantially a vertical position causing its respective switch point rail to be slightly raised during its movement between such oblique and vertical positions, whereby two points of a track switch are caused to assume a proper position with a minimizing of the friction between the movable points and their respective tie plates and stock rails, and whereby each such supporting member is self-adjusting longitudinally with respect to normal contraction and expansion of the rails longitudinally and also as caused by the operation of the switch points.

2. In a friction reducing structure for a railroad track switch according to claim 1 wherein the track switch includes a stock rail having a head portion and a switch point having a web portion and a base, said switch point being movable to an open position spaced from the inside face of the head portion of the stock rail and movable to a closed position with the upper part of the outside face of web portion in engagement with the inside face of the head portion, wherein the socket portion of the support bracket is positioned inwardly of the inside face of the web portion above said base, wherein the rocker support rod is positioned laterally to be substantially directly beneath and spaced from said socket portion when the switch point is in its open position, wherein the supporting member causes said switch point to travel upwardly in an arcuate path about the pivotal axis of said rocker bearing support rod when the switch point is moved to an open position and to cause said switch point to travel downwardly in an arcuate path when the switch point is moved to its closed position, and wherein said socket portion is so located that an extension of the arc of travel of the upper end of the supporting member intersects the switch point above its base, whereby the weight of the switch point causes the supporting member to provide an increased downward and outward force against the web of the switch point when in its closed position.

3. In a railroad track switch as claimed in claim 2 wherein said socket portion is positioned inwardly of the inside face of the web portion above said base well upwardly toward the top of the switch point, whereby the weight of the switch point causes the supporting member to force the upper portion of the switch point against the inside face of the head of the stock rail when in a closed position to keep the switch point from tilting or rolling away from the stock rail when in said closed position.

4. In a friction reducing bearing support structure for a railroad track switch having its two movable switch point rails interconnected by switch rods and operable between normal and reverse positions adjacent its two stock rails, a bridge member adjacent each switch point secured at its outer ends on the upper surfaces of two adjacent railroad ties and having downwardly offset portions interconnected by a rocker bearing rod, a socket member attached to each switch point rail and having a socket portion for receiving a ball member, a holding lug attached to said socket member, a supporting member for each switch point rail having one end mounted on its respective rocker bearing rod and having an integral ball member at its other end received by its respective socket portion, said supporting member also having a hole through its main body for receiving its respective holding lug, a bar extending beneath said stock rail and said switch points and secured to said stock rails, a hold-down arm attached to each supporting member positioned to engage the under side of said bar member when its respective switch point rail is in a closed position, each of said bridge members being located that when its respective supporting member is substantially vertical its respective switch point rail is in an open raised position and when its respective supporting member is at an oblique angle its respective switch point rail is in a closed lowered position.

5. In a friction reducing bearing support structure for a railroad track switch having its two movable switch point rails interconnected by switch rods and operable between normal and reverse positions adjacent its two stock rails, a bridge member adjacent each switch point secured at its outer ends on the upper surfaces of two adjacent railroad ties and having downwardly offset portions interconnected by a rocker bearing rod, a socket member attached to each switch point rail and having a socket portion for receiving a ball member, a supporting member for each switch point rail having one end mounted on its respective rocker bearing rod and having an integral ball member at its other end received by its respective socket portion, a bar extending beneath said stock rail and said switch points and secured to said stock rails, and a hold-down arm attached to each supporting member positioned to engage the under side of said bar member when its respective switch point rail is in a closed position, each of said bridge members being located that when

its respective supporting member is substantially vertical its respective switch point rail is in an open raised position and when its respective supporting member is at an oblique angle its respective switch point rail is in a closed lowered position.

6. In a friction reducing bearing support structure for a railroad track switch having its two movable switch point rails interconnected by switch rods and operable between normal and reverse positions adjacent its two stock rails, a bridge member adjacent each switch point secured at its outer ends on the upper surfaces of two adjacent railroad ties and having downwardly off-set portions interconnected by a rocker bearing rod, a socket member attached to each switch point rail and having a socket portion for receiving a ball member, a holding lug attached to said socket member, and a supporting member for each switch point rail having one end mounted on its respective rocker bearing rod and having

an integral ball member at its other end received by its respective socket portion, said supporting member also having a hole through its main body for receiving its respective holding lug, each of said bridge members being located that when its respective supporting member is substantially vertical its respective switch point rail is in an open raised position and when its respective supporting member is at an oblique angle its respective switch point rail is in a closed lowered position.

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